Colder weather on the way

Description

With the weather turning colder from this weekend onwards there is increased interest in the chances of snow. However, there are still some uncertainties in the forecast, with models differing on whether we will see air from the north or east crossing the UK. Both of these scenarios will be cold, however they have differences in just how cold we might see.

As we go through the next few days the UK will stay mainly in an easterly airflow with settled, largely dry conditions and a continued risk of fog. Temperatures will start to trend downwards through the weekend, and it will feel even colder in the brisk easterly wind. Temperatures will be near or just below average for the time of year, only reaching mid to high single figures for many.

Next Week

Met Office Deputy Chief Meteorologist, Tony Wardle, said; “Uncertainties in the forecast start to develop as we head through next week with models offering two possible scenarios. We could continue in an easterly airflow, or we could see air crossing the UK from the north. Both these scenarios will result in cold weather but, it is important to note, neither scenario will bring anything unusual for this time of year in the UK.”

Of the two scenarios a **northerly** airflow is slightly more likely and will result in brighter, but colder weather with much of the UK seeing daytime temperatures not reaching more than 0C – 4°C by day and -2 to -6 overnight.

While snow is possible in both scenarios, in a northerly airflow snow showers are slightly more likely with wintry showers possible to lower levels.

If we see the **easterly** airflow continuing the temperatures will also trend downwards from this weekend but are unlikely to be as cold as in a northly airflow with much of the UK seeing 2 to 5°C by day and -2 to –4°C overnight.

However, the brisk easterly wind will continue to make it feel even colder. The weather will remain murky, but it will be drier, and any snow will be largely restricted to high ground in the north.

Snow risk and temperatures in context

Whichever scenario happens it is important to bear in mind, that there’s no indication in the current forecast that we are expecting any weather beyond what we’d normally expect at this time of year. Although, there’s an increasing risk of sleet or even snow showers this is not unusual in early December. There is no indication at this stage that the colder conditions will be in any way comparable with the notable cold spell in February/March 2018. ???????

However, as already mentioned, next week will be cold compared to average, whichever scenario plays out. Temperatures will struggle to reach low single figures for many at times in marked contrast

to the mild conditions we have seen throughout much of Autumn. We would expect average temperatures (1991-2020 averaging period) for the south of England to be around 8°C in December, while in Scotland closer to 6°C. The average overnight lows are 2°C and just above 0°C respectively.

Keep up to date with the most recent forecast on our website, by following us on Twitter and Facebook, as well as on our mobile app, available for iPhone from the App store and for Android from the Google Play store. Keep track of current weather warnings on the weather warning page. You can find out more about snow in the UK on our website.

Date Created
December 2022

Changing climate: Changing wildlife

Description

Delegates at the COP15 biodiversity summit in Montreal currently are grappling with ways to stem the global decline in wildlife and to slow the rate of species' extinction.

Ahead of the summit, Environment Secretary Thérèse Coffey indicated the 'vital' need that the world agrees to 'tackle together the decline in nature and habitats and set out a road to recovery'.

Most agree that the biodiversity crisis is one of the greatest challenges affecting the planet, but it is also in part linked to one of the other greatest challenges: climate change.

Wildlife species around the world are declining for many reasons, including habitat destruction, over harvesting, persecution and the introduction of non-native species. Changes wrought by climate change are an additional 'stressor' creating further impacts for already-threatened species.

The UK Government is urging countries to agree a deal for nature at the UN Convention of Biological Diversity. But these ambitions for nature will have to encompass the changes that we are already seeing among native wildlife, including the shifts that many species will have to make as their climate space – the zone of suitable conditions for an individual species – moves with climate change.

Grahame Madge is a Met Office spokesman with interests in wildlife and climate change. He said: "These shifts can be seen wherever you look. Even in the grounds of the Met Office we are continuing to record new species; species which formerly wouldn't even have been recorded in the UK a few decades before.

"Over the last 50 years several species of bird and insect have colonised the UK and these have subsequently been recorded by wildlife enthusiasts at the Met Office, and some of these species are now recorded as regular visitors.

"In the last couple of years I have been fortunate to add two of these species to the site's ever-growing list: small red-eyed damselfly and little egret."

Both of these species have colonised the UK from further south in Europe after gaining a UK foothold in the late 1990s. Grahame Madge added: “Our site also regularly supports tree bumblebee, which was first seen in the UK in 2001, and we have recorded Cetti’s warbler as an occasional visitor: this bird only started nesting in the UK in 1972.

“There are many more colonising species that we can expect to add to the site’s list – which has just peaked above 500 species. There are many species in northern France and Belgium which could conceivably colonise the UK in the next decade or two as the climate of parts of southern England become more like Continental Europe.”

However, for those species to spread to the UK they need to be able to cross the English Channel. Grahame added: “For birds, colonisation of the UK can be a relatively straightforward process, especially for those species which move long distances on migration. In the next few years there are another half a dozen species of bird at least which could become regular breeding birds here, including black-winged stilts and bee-eaters.

“A number of damselflies and dragonflies look set to make the leap and even one or two butterflies could be joining us: who will be the first person in the UK to spot the southern small white butterfly which is rapidly flitting northwards in Europe from the Mediterranean. Could it turn up first at the Met Office following some warm southerly wind next summer and be spotted by our butterfly recorders? We will keep watching!”

Many recent studies have reinforced the fact that wildlife is declining across the world, and although some species are coping better with the threats they face by colonising new areas, many others are struggling.

The State of Nature report 2019 https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf – was produced by a coalition of 70 organisations involved in the recording, researching and conservation of nature. It showed that more species surveyed have shown strong or moderate decreases in abundance (41%) than increases (26%) since 1970, and likewise more species have decreased in distribution (27%) than increased (21%) since 1970.

Grahame concluded: “It is clear that we will continue to see many change to our threatened wildlife. Among the most vulnerable in the UK are those species at the southern limit of their range here. Those species, such as the ground-hugging dwarf willow, occurring in the north of Scotland, especially in our highest uplands don’t have space to shift their distributions. Further climate change will make them vulnerable to extirpation in the UK.”

Date Created
December 2022

Winter outlook in the media

Description

Today, the Mail on Sunday has run a front-page story saying that government insiders have ‘accused the Met Office of failing to predict the severity of our latest big freeze’.

Simply, this is just not true – the potential for cold weather in December was signalled as early as September and included in briefings to stakeholders across government and industry, helping them to prepare robust contingency plans to minimise any potential impact from cold weather.

In fact, our winter outlook issued in October highlighted the most likely scenario for December was for high pressure near the UK allowing for a northerly air flow, leading to cold snaps with the threat of snow and ice. Exactly the weather we have seen through the last few weeks.

The Mail on Sunday’s sister paper, the Daily Mail, reported on our winter outlook back at the very beginning of November, using the headline ‘Britain braces for blackouts as Met Office warns of much colder winter’. The Daily Mail reported at the time that the Met Office outlook suggested that the UK’s winter had a greater chance than normal of being colder than average.

The Met Office continues to work hand in hand with government and industry, keeping them up to date on the latest forecasts and outlooks. While the colder weather we have seen in recent weeks, is now giving way to milder conditions, some colder spells are still possible through the rest of December and into January. Milder conditions are signalled from late January, with an increased chance of strong winds and heavy rain. This remains in the current long-term outlook for the winter period.”

Suggestions that a failure by the Met Office to warn of the current cold snap leading to blackouts is just not true, and any suggestion otherwise is alarmist and scaremongering.

Date Created
December 2022

International collaboration ‘vital’ for space weather scientists

Description

The borderless potential impacts of space weather means international collaboration is ‘vital’, according to Kate Brand, National Manager of the Australian Space Weather Forecasting Centre.

Kate’s team has been on a tour of space weather forecasting centres in the Northern Hemisphere and spent three days with the Met Office Space Weather Operations Centre (MOSWOC), sharing knowledge and collaborating on space weather services.

“We see the Met Office as a global standard for space weather forecasting centres,” said Kate.

“We wanted to develop our relationship with the centre here and share the way we do things and also find out how the Met Office operates and work out areas we can collaborate and build on each other’s strengths.”

Similarly to the Met Office, the Australian space weather forecasters work under the umbrella of their national meteorological service and provide a 24/7 space weather forecasting service, keeping an eye on the sun for solar flares, solar radiation storms, and coronal mass ejections which can cause geomagnetic storms on Earth.

While coronal mass ejections are responsible for the Aurora Borealis and Aurora Australis, powerful geomagnetic storms

also have the potential to impact communications systems and, in exceptional circumstances, ground-based infrastructure. Forecasting for the events helps key industries take steps to mitigate the worst impacts.

It's because of those potentially wide-reaching impacts that Kate says visits like the ones they've been undertaking are vital for space weather scientists.

Kate said: "It's vital to link up with others on this. The space weather community is relatively small and there are many problems to solve. I don't think any centre could do everything on their own so it's important to work together globally."

Met Office Senior Account Manager of Space Weather Krista Hammond said: "It has been great having the Australian Space Weather Forecasting Centre come to visit us at the Met Office.

"We've been talking through the different challenges we face in terms of forecasting for different industries, how to best communicate these messages, and how we can potentially work more closely together in the future."

With recent news of the long-awaited Vigil mission officially getting the green light, Kate concluded that it's a good time to see more developments in the field.

"Vigil is going to be a critical mission for future space weather forecasting capabilities going forward so we're excited that it's all going ahead," said Kate.

Date Created
December 2022

Improving habitat resilience in Devon

Description

Devon has long supported a rich diversity of important habitats and species. However, many of these habitats have experienced significant declines in recent years. Much of the Devon landscape has been simplified as a result of the focus on commercial agriculture, forestry, and urbanisation.

The loss of habitats and species has been considerable. Arguably Devon's most important habitat, Culm Grassland, declined in extent by 50% between 1984 and 1990. During this period more widespread habitats such as hedges declined by 20% and alarmingly only 41% remain in good condition today.

The Met Office developed the Habitat Resilience Tool for Devon as a joint venture with the Devon Wildlife Trust (DWT) in 2012. This has been used extensively by DWT to support their nature recovery projects across Devon. Ten years since the tool was developed, some of the people who worked on it from the Met Office and DWT look back on the development process and how the Devon landscape has changed in the years that followed.

Supporting decision-making

The challenge was clear: to restore habitat resilience as well as the components required to secure habitats, helping them to increase in number, become larger in size and improve in quality. In order to identify habitat resilience in Devon, the team developed five indexes to represent different components that collectively influence how robust our habitats are.

1. Habitat status index – reflects the relative importance of the habitat. Habitats with higher status and better legal protection are given higher resilience values.

2. Positive management index – ranks areas across Devon by how well managed the land is. Better managed land is assumed to relate to a habitat with higher resilience.

3. Climate sensitivity index – the sensitivity of habitats to the effects of climate variability and climate change. More sensitive habitats are given lower resilience values; less sensitive habitats have higher resilience values.

4. Habitat fragmentation index – the size, shape and distance from one wildlife rich area to another affect the resilience of that habitat. The ability for species to move between habitat fragments was also incorporated. Higher resilience areas occur in larger, connected regions with high quality matrix of land in between.

5. Topographic index – a more varied landscape allows species to move and populations to change at a given site. This index links areas with greater variation in elevation, slope and aspect tothose with higher habitat resilience.

According to Dr Debbie Hemming and Neil Kaye from the Met Office, who worked on developing the tool, “The Habitat resilience tool has been designed to support Devon Wildlife Trust, and other land managers, to make appropriate decisions to manage our environment, such as implementing measures for species conservation or planning land use and green infrastructure activities. The tool combines Met Office expertise in plant science and geographical web tool development with knowledge and information on our environment held by Devon Wildlife Trust and Devon Biodiversity Records Centre.”

Peter Burgess, the Director of Nature Recovery at DWT, also helped develop the tool and is the main user. He said, “The Habitat Resilience Tool has proven to be a great asset in supporting the development of large-scale nature recovery projects in Devon – from works to reconnect landscapes to threatened great horseshoe bat populations which forage over large landscapes, to targeting of focal landscapes for the restoration of internationally important Culm grasslands. The tool supports high level decisions to prioritise key landscapes for concerted conservation effort between DWT and a wide range of partners.”

Improving habitats

Photo credit: Mike Symes, DWT

The population of Greater Horseshoe Bats (GHB) has declined by 90% in the UK during the last 100 years. Similar trends are seen across northern Europe, with Devon now a stronghold for the species.

Another species which has flourished in Devon over the past decade is the wild beaver. This has been reintroduced as part of the River Otter Beaver Trial, England’s first wild beaver re-introduction project, pioneered by Devon Wildlife Trust. In 2022, Devon has thriving beaver populations on several rivers in addition to the River Otter, including growing beaver populations on the River Tamar and the River Taw.

Photo credit: Mike Symes, DWT

Encouraging biodiversity

A key area of biodiversity in North Devon is the Culm Grassland, located between Exmoor and Dartmoor, which has led to many referring to it as ‘the land between the moors’. Its name refers to the predominance of Culm Grassland, a mix of purple moor grass and rush pasture.

It is also a landscape facing enormous challenges. Many elements of modern farming do not support the financial health of the small, mixed farms that predominate in the Culm; tourism is underdeveloped and the area’s geographical isolation all means that this is a place of significant economic deprivation. The unique landscape that is so key to the economic health of the area and to people’s well-being is disappearing. 90% of the Culm’s unique habitat has been lost since 1950.

Photo credit: Mike Symes, DWT

Working in partnership

Using the Habitat Resilience Tool, DWT and other land managers across Devon are able to track and study landscapes and habitats more thoroughly and pinpoint areas which are in need of more resources.

The success of the Habitat Resilience Tool for Devon for supporting DWT with the development of large-scale nature recovery projects in Devon has highlighted the potential for this tool to be replicated at other locations. This possibility is currently being explored for other wider Wildlife Trust areas across the UK.

DWT will continue to use the tool to help strategically guide new and ambitious projects alongside the Devon Nature Recovery Network Map. DWT is currently exploring the feasibility of reintroducing wildcats to the South West and the tool has already informed initial landscape appraisals.

During December we have been exploring the topic of biodiversity – follow #GetClimateReady on Twitter to learn more.

Date Created
December 2022

Reflection of a sustainable ‘grand oasis’ in space

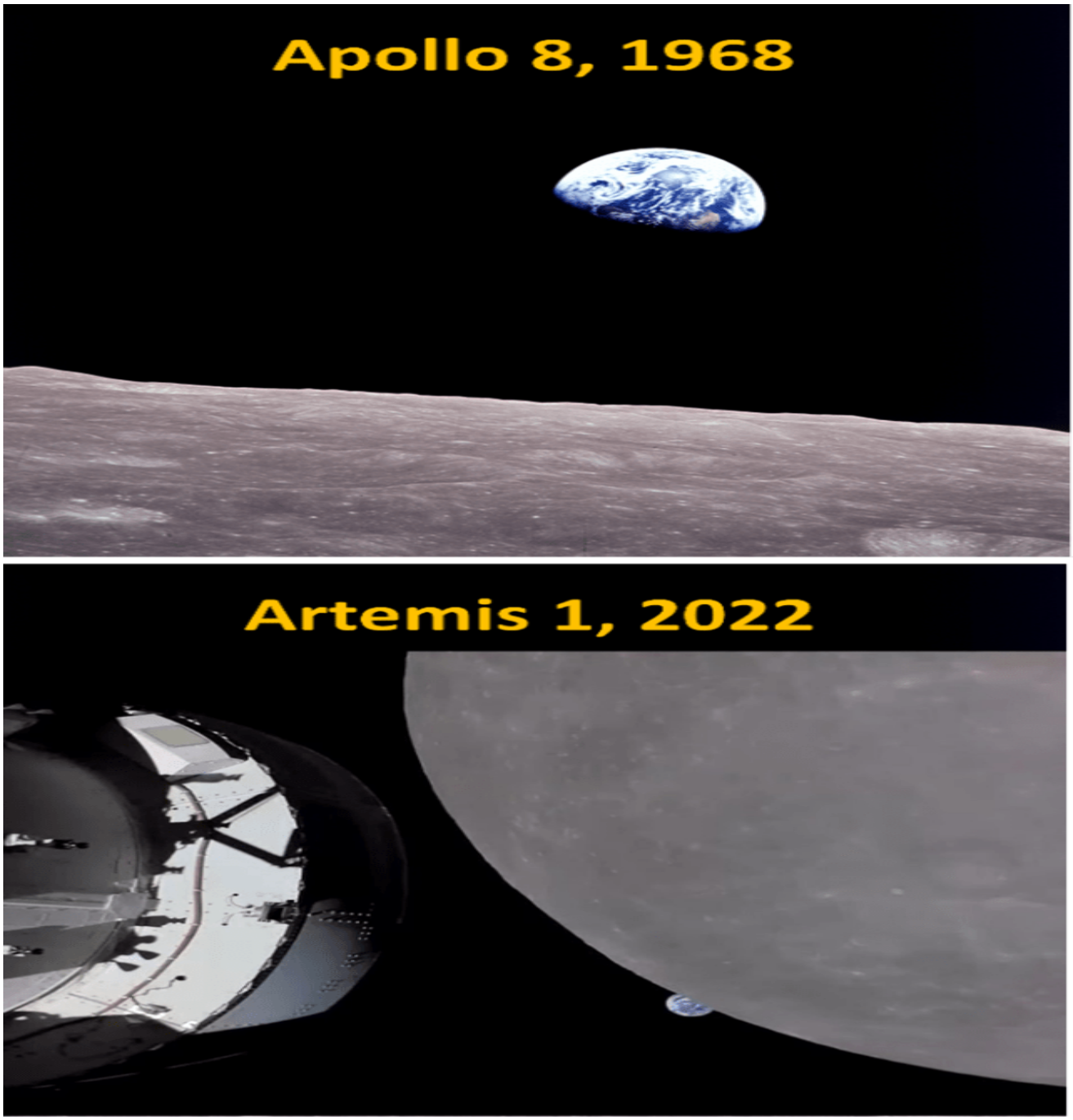
Description

Met Office scientist Nick Dunstone reflects on the latest ‘Earthrise’ image captured recently by Artemis 1 and how our climate has changed in the 54 years since Apollo 8 took the original iconic photo.

“Oh my God! Look at that picture over there! There’s the Earth coming up. Wow, that’s pretty,” said NASA astronaut Bill Anders’ when seeing the Earth appearing to rise above the lunar horizon as their Apollo 8 spacecraft came around the moon on Christmas Eve 1968.

It was a unique vantage point: the first-time any human had seen our planet at such a distance, and from another celestial body.

As fellow astronaut Jim Lovell said a few hours later: “The Earth from here is a grand oasis in the big vastness of space.”



Images: NASA

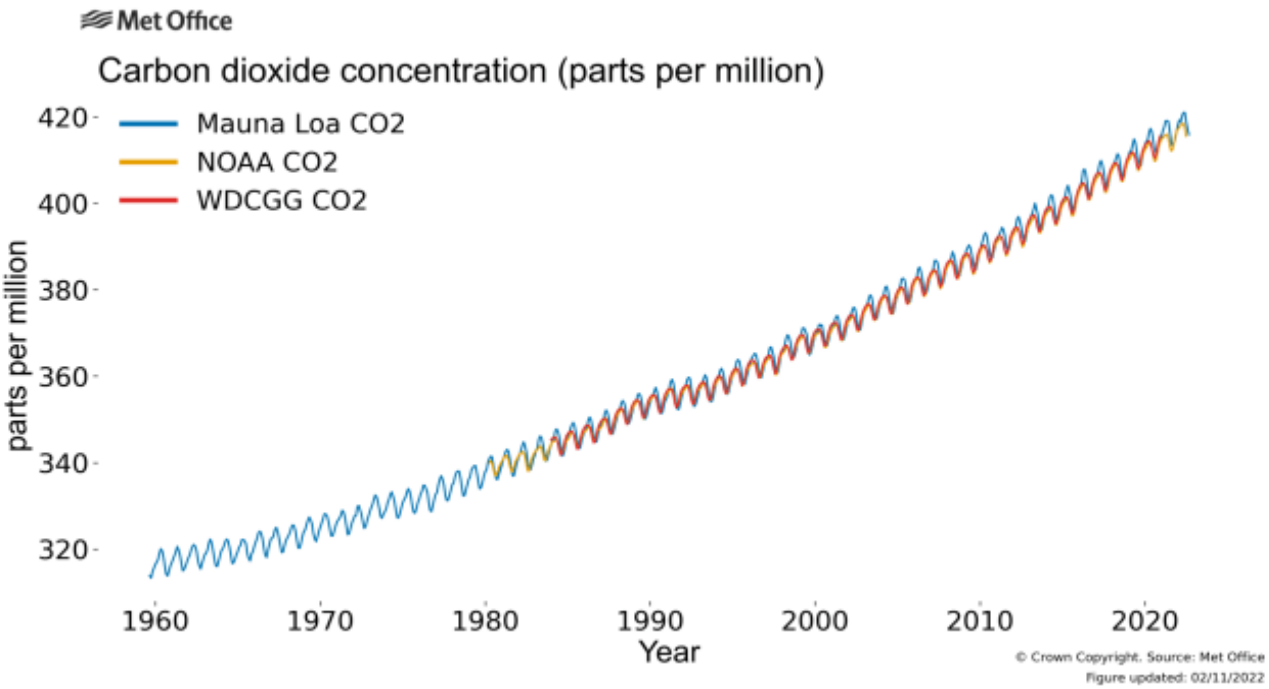
That original Earthrise image is widely credited with helping to set the mainstream environmental movement in motion. Although I wasn't born when the original Apollo 8 photo was taken, a framed print of it hangs above my desk as a reminder of the beauty and fragility of our planet.

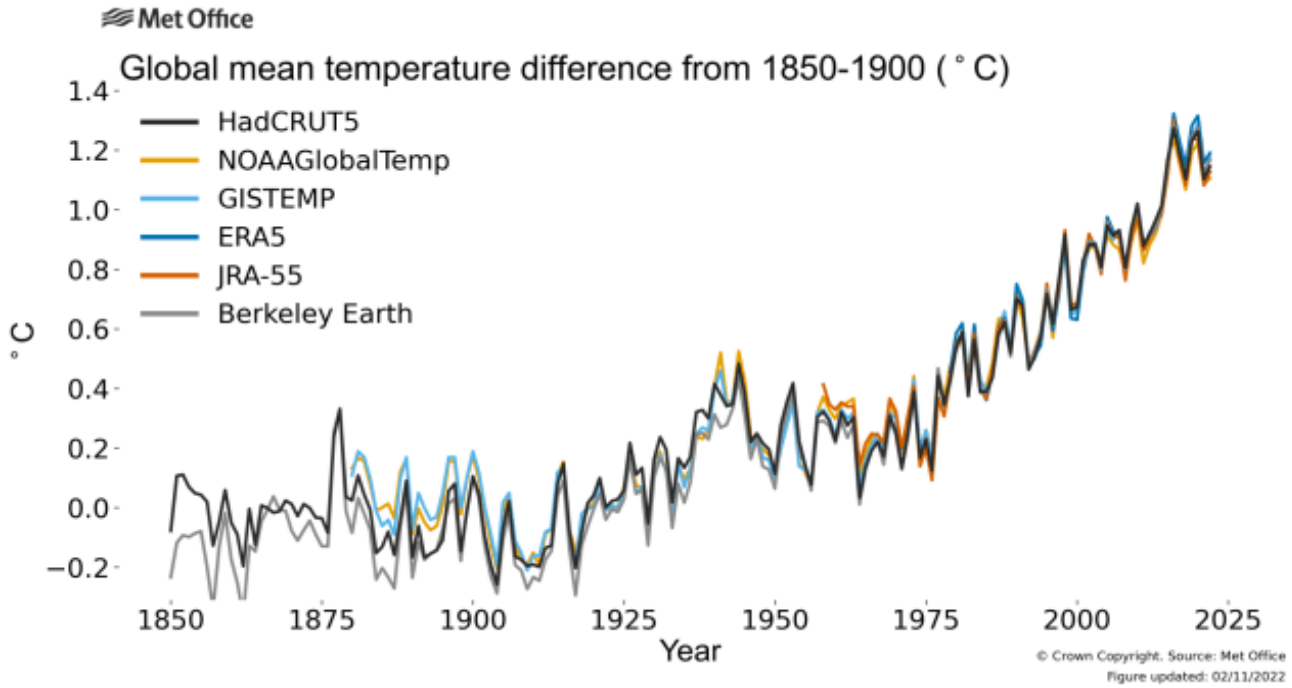
Artemis is the new NASA programme to return humans to the Moon and then beyond to Mars. Artemis 1 is the unmanned test flight before the crewed Artemis 2 mission in 2024, and so there was no one scrambling to find the colour film for this new image. Much has changed since 1968, and I wanted to reflect briefly on the changes to our planet between these two beautiful images, taken 54 years apart.

Firstly, there are a lot more of us on the planet now. This year we passed the 8 billion global population milestone, meaning the number of people on the planet has more than doubled from the ~3.5 billion in 1968. Half a century of continued industrial development – driven primarily by burning fossil fuels – has led to a rapid increase in the concentration of carbon dioxide (and other greenhouse gases) in our atmosphere.

This is clearly illustrated by the iconic 'Keeling curve', which plots the continuous record of atmospheric carbon dioxide from Mauna Loa Observatory in Hawaii (started by Charles Keeling in 1958).

This curve, shown below, shows a steep and steady upwards trajectory, increasing from ~320 ppm in 1968 to almost 420 ppm in 2022 – that's a 100 ppm (31%) increase – with no sign yet of slowing down.





Observed timeseries of atmospheric carbon dioxide concentration and global mean surface temperature with added logos for the Apollo 8 and Artemis 1 missions. For latest updates on these and other key climate change indicators, visit the Met Office climate dashboard.

This additional 'blanket' of greenhouse gases has increased the surface temperature of our planet. The World Meteorological Organisation (WMO) global temperature record is plotted above and made from five different analyses of global temperature data, including the Met Office's own HadCRUT5. It shows the Earth's surface has warmed by approximately +1°C since the Apollo 8 Earthrise photo was taken.

Given that current global temperature is +1.2°C above the pre-industrial 19th Century climate, we can see that by far the most of this warming has occurred in the last half century. Whilst an average global temperature increase of +1°C may not sound large, it means that extreme hot climate events are much more likely. For example, the UK experienced another very warm summer this year placing it amongst the hottest five summers on record, with four of those five having occurred since 2000.

During this summer, the UK experienced a new daily maximum temperature record, when 40.3°C was recorded at Coningsby, Lincolnshire on 19 July. This is the first time that 40°C has been recorded in the UK, and Met Office research has estimated that this event is as much as 10 times more likely in the current climate than under a natural climate unaffected by human influence.

There is an enduring legacy of the technologies developed during the mid-20th century space race that have transformed our ability to understand, monitor and predict changes to our climate. Thanks to the many Earth observation satellites launched in the past half century we now have continuous monitoring of many key components of the climate system, including sea-surface temperature, sea level, polar sea-ice extent, glaciers and land-surface changes.

Unfortunately, many of these reveal worrying trends, such as increased frequency of terrestrial and

marine heatwaves, Arctic sea-ice loss, glacial retreat, ice sheet mass loss, deforestation of tropical rainforests and relentless sea-level rise. The other technological ‘quantum leap’ since 1968 is the enormous increase in computing power that allows us to simulate the global climate system.

By combining improved Earth observations and climate models run on powerful supercomputers, we can seamlessly predict global weather and climate from hours to centuries. Thanks to these efforts our understanding of the global mean climate response due to rising greenhouse gases is now mature and provides clear evidence for the mitigation pathways needed to avoid dangerous levels of climate change.

However, one of the key remaining challenges in climate science is understanding the detailed dynamical changes that will drive regional climate change. For example, the regional changes in monsoon systems and the mid-latitude jet streams are still uncertain with a large spread in their projected changes between different climate models.

Recent work – led by Met Office scientists – has used seasonal to decadal climate predictions, which are on timescales short enough to be verified, to identify that current climate models have spuriously weak signals in extratropical circulation. Whilst we do not yet fully understand the cause of this issue, we are becoming increasingly aware that such large-scale dynamics is connected via feedback loops to small-scale processes, such as transient eddies in the atmosphere, air-sea interactions and intense local convection.

Many of these physical features are not explicitly simulated at the relatively coarse resolutions (~50-150 km grid spacing) of the current generation of climate models that are used to make decadal to centennial climate predictions. Therefore, we are now striving as a community to push towards higher-resolution global climate models where these processes can be modelled more fully; allowing us to better quantify the regional responses to climate variability and change. To enable us to start running such models we are taking advantage of more powerful supercomputer facilities and optimising our climate models to make best use of them.

Looking ahead, I hope that by the time astronauts take the first Earthrise photo from Mars (perhaps in the mid to late 2030s), we as a global society are making good on our carbon emission reduction pledges. Then, as we head towards net-zero carbon emissions, the Keeling curve will be starting to level-off and global temperature will have begun to stabilise. Achieving net-zero is this century’s ‘Moonshot’ and the prize is minimising the severity of the worst of the projected climate impacts of global heating (including heatwaves, droughts, floods, sea-level rise) and hence leaving our children, and future generations, with a sustainable ‘grand oasis’ in space.

Nick Dunstone’s work at the Met Office includes the global temperature forecast. The forecast for 2023 has been published here.

Date Created
December 2022

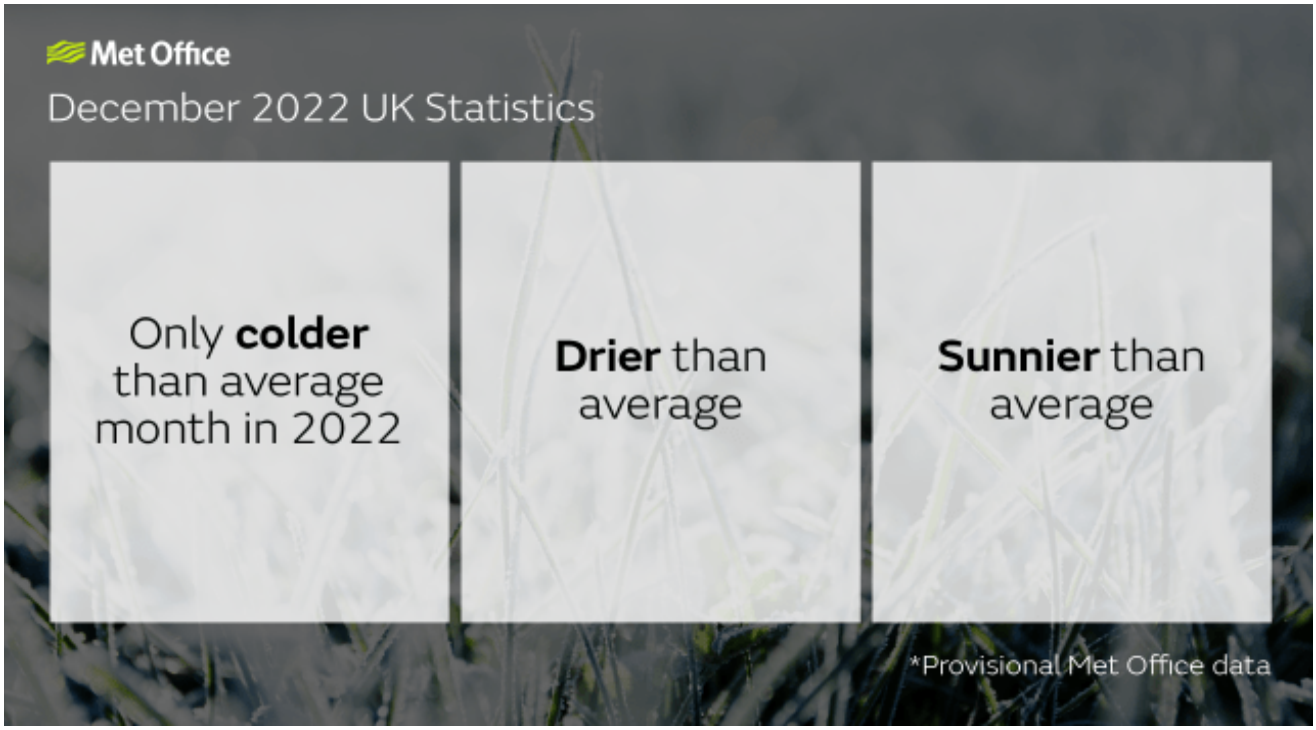
Cold December concludes warmest year on record for UK

Description

NOTE: This blog has been updated on 3 January to include the full provisional statistics for December 2022.

A cold December bucked the trend of 2022 and ended the year as the only month which saw below-average temperatures, according to provisional Met Office figures.

With 2022 provisionally confirmed as the UK's warmest year on record for the UK December ended a 15-month run of above average temperatures (from September 2021) with an overall cool, dry and sunny month for the UK compared to 1991-2020 long-term averages.



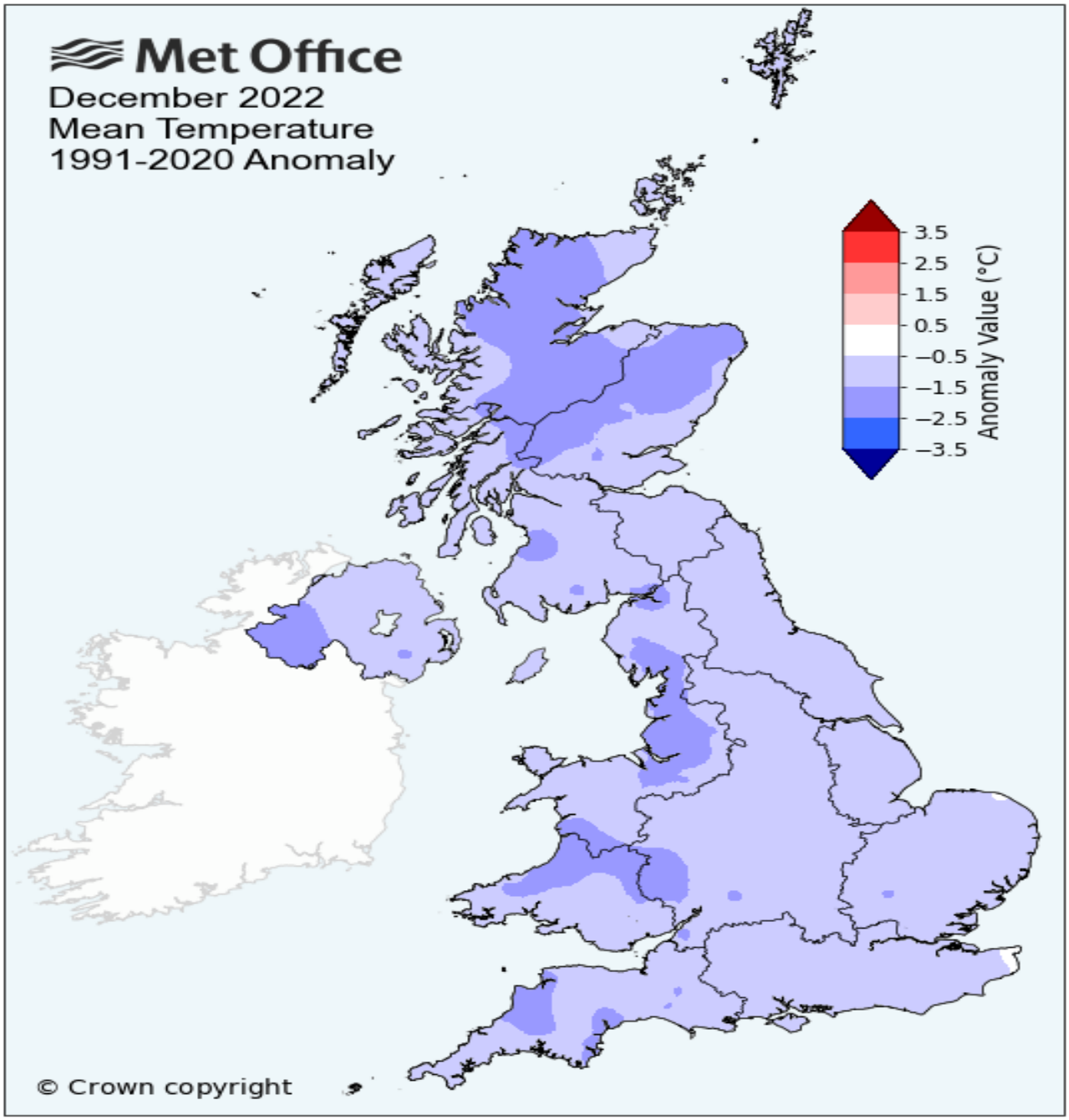
Mostly cold and dry

The first two weeks of December were the coldest start to meteorological winter since 2010, with high pressure and a cool northerly airflow resulting in a prolonged spell of low temperatures with snow and icy conditions at times, albeit with interludes of clear skies.

A weather station at Braemar, Aberdeenshire, recorded the lowest daily maximum temperature of the year, with -9.3°C the highest it reached on 12 December. In the early hours of the following morning, the same station recorded the lowest minimum temperature of the year with –17.3°C.

The cold snap ended with a dramatic change to much milder conditions bringing widespread thaw

conditions. Temperatures for the remainder of the month were mostly above average for the time of year, though December overall will still go down as a cool month for the UK with the average mean temperature at 2.9°C, which is 1.3°C cooler than the 1991-2020 average.



December 2022 mean temperature

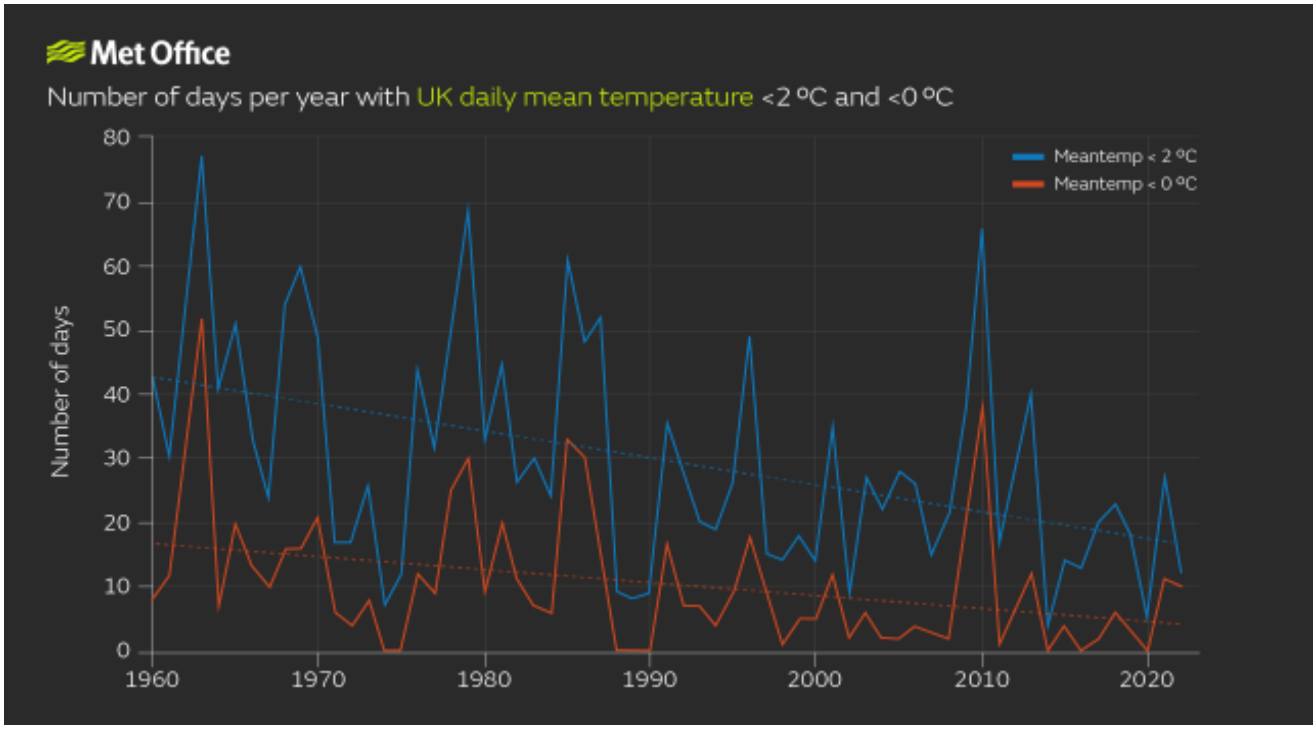
Those cool conditions were replicated across the UK with England, Wales, Scotland and Northern Ireland all seeing temperatures around 1.4°C lower than their average for the month, though not cold enough to trouble any records. For comparison, December 2010, the UK's coldest December on record in a series from 1884, was an exceptional 5.1°C colder than the 1991-2020 average.

Mike Kendon is a climate information scientist working for the National Climate Information Centre in the Met Office. He said: “December’s weather will principally be remembered for the notably cold start to the month, with prolonged low temperatures, hard frosts and snow and ice at times, even to areas further south in the UK.

“This cool weather was principally brought on by an Arctic Maritime airmass, with daytime temperatures struggling to rise above freezing for many in what was one of the most significant spells of low winter temperatures since the exceptional December of 2010.”

Cold weather and climate change

Although the UK will continue to experience a number of cold spells of weather, the frequency, severity and durations of these temperatures has declined as a result of climate change, as can be seen in observational data and as part of a post-event report on early December’s low temperatures.



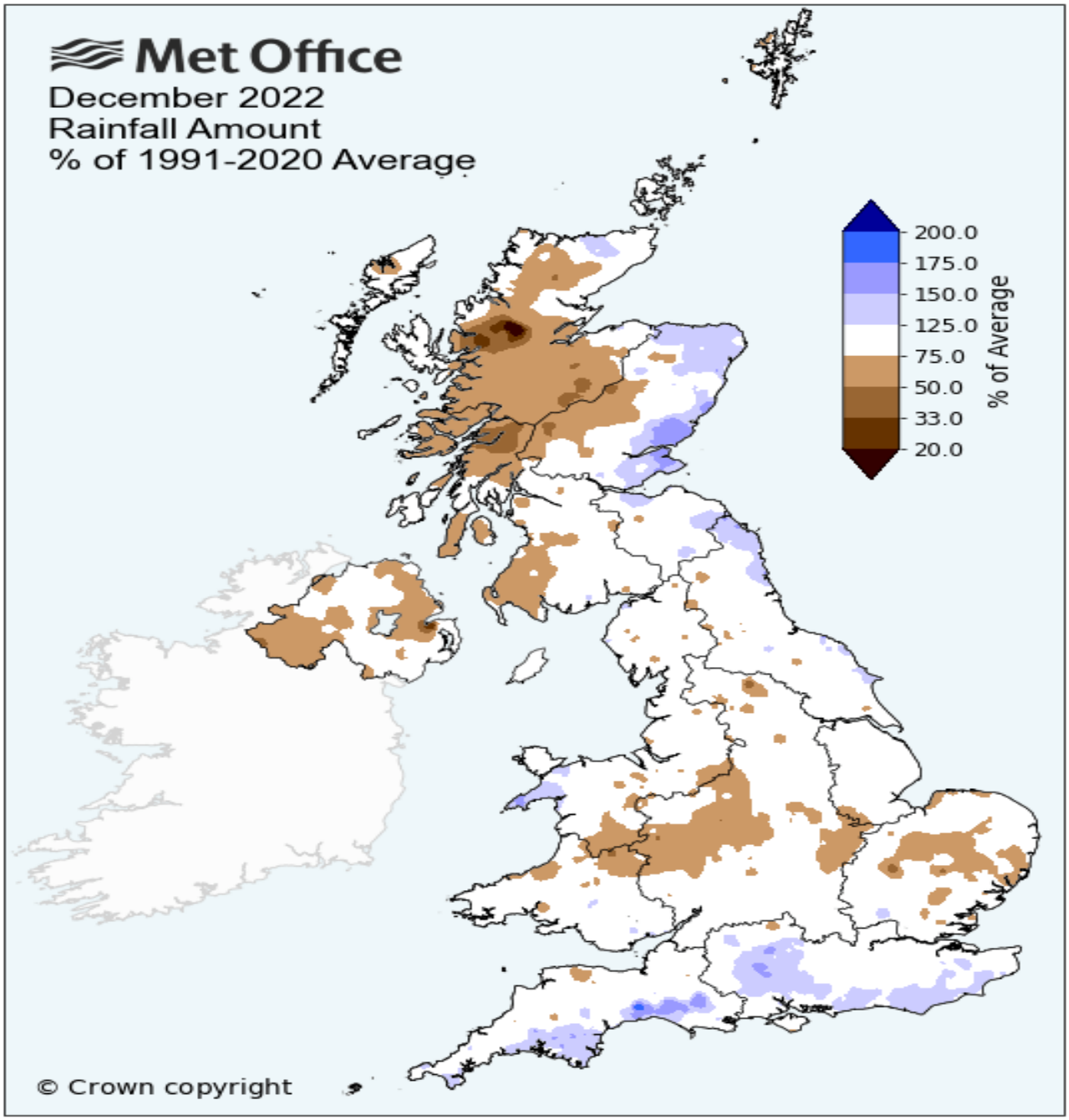
The graph’s blue and red lines show the number of days in each calendar year from 1960 when the UK-wide mean temperature was below 2°C and 0°C respectively, with the hatched lines showing a downward trend.

Mike Kendon added: “Such is the variability of the UK climate, we’ll always experience cold weather. However, what our observed data shows is the decreasing prevalence and severity of these events in a changing climate. Using 30-year climate averaging periods from 1961-1990 and 1991-2020, the number of days where mean temperature for the UK was below 2°C has decreased by a third within this thirty-year period, and the number of days below 0°C has halved. These are dramatic changes.

“The fact that we’ve seen the warmest year on record for the UK in 2022 despite the cold December

weather demonstrates how persistently warm the rest of the year was, with every season's mean temperature sitting in its top 10 on record in a series which goes back to 1884."

Dry December



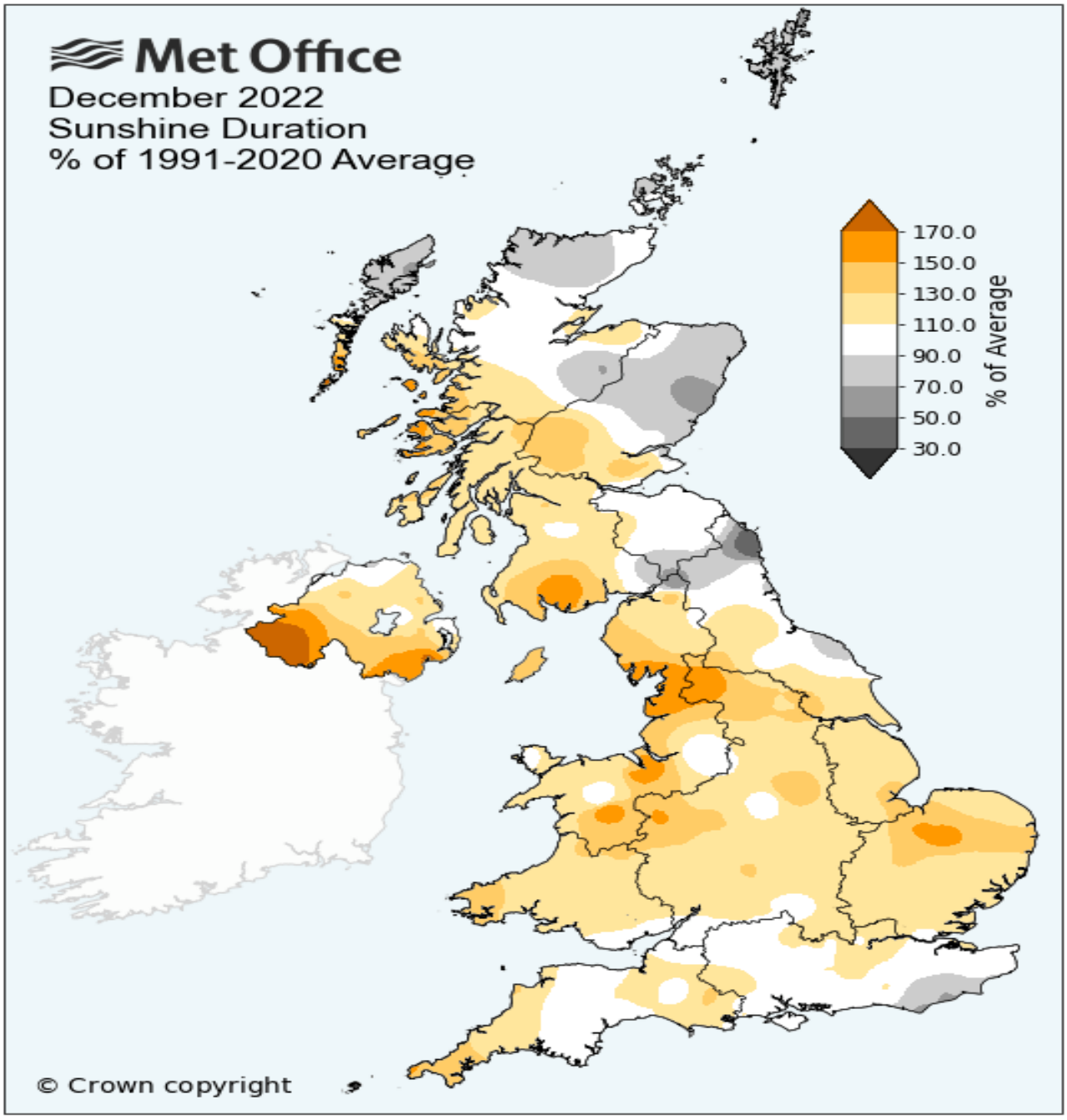
December 2022 rainfall amount

Despite late-month rainfall bringing figures up, December remained drier than average for the UK. With milder Atlantic air and associated rain-bearing fronts blocked during the cold spell, there was little precipitation overall across many parts of the UK for the first half of the month.

The UK had 111mm of rain in December, which is 87% of the average.

Northern Ireland has been the driest of the UK regions, with 89.1mm of rain in the month putting it at around three quarters (74%) of what you'd expect in December. England saw 89.3mm (97% of average) and Wales 165.3mm (94% of average).

Sun shines for most



December 2022 sunshine hours

High pressure and clear Arctic air resulted in plentiful clear skies to be found in December, with the exception of northern Scotland, and the UK seeing 16% more sunshine hours than average.

Western areas generally saw more in the way of sunshine, but the vast majority of the UK has had a bright, albeit cold, month of weather. Northern Ireland has seen more than a third more sunshine hours than average (134% of average), Wales 24% more than its average and England 17% more than its average. Scotland will end the month with near-average figures for sunshine.

Provisional December 2022	Mean temp (°C)	Sunshine (hours)	Rainfall (mm)

	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	2.9	-1.3	49.4	116	111.0	87
England	3.5	-1.3	59.7	117	89.3	97
Wales	3.4	-1.4	51.0	124	165.3	94
Scotland	1.6	-1.4	31.4	105	136.6	79
N Ireland	3.4	-1.3	51.2	134	89.1	74

Date Created
December 2022